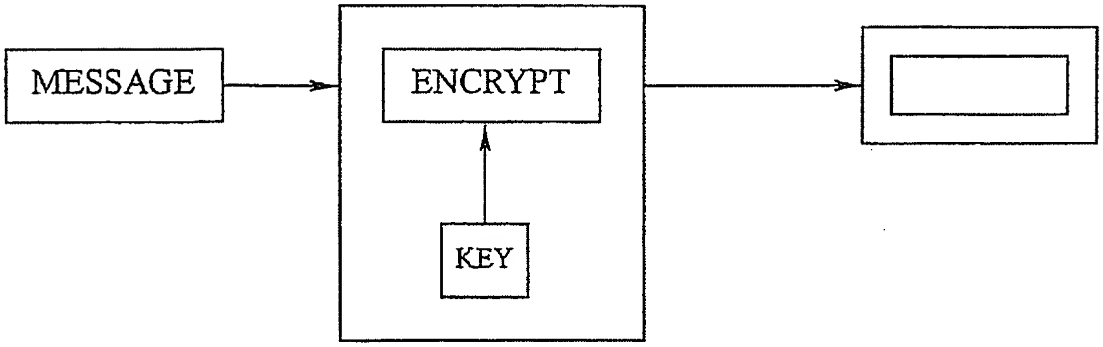
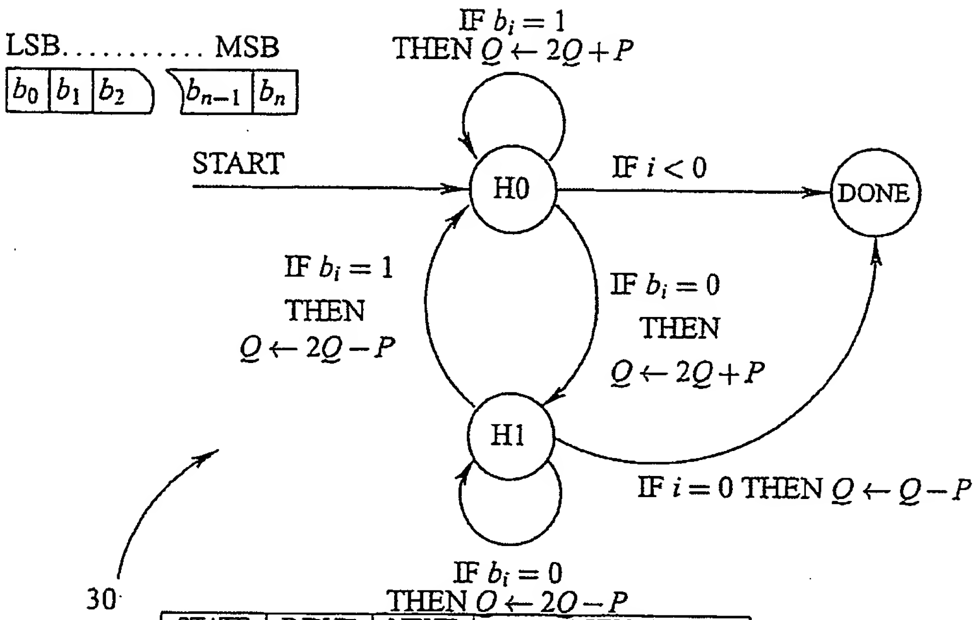


Fig. 1

629 =	2^9	2^8	2^7	$+2^6)$	$+2^5$	$+2^4$		$+2^2$		$+2^0$
=	1	0	0	1	1	1	0	1	0	1
=	+1	+1	+1	−1	+1	+1	+1	−1	+1	−1
=	2^9	$+(2^8$	-2^7	$-2^6)$	$+2^5$	$+2^4$	$+(2^3$	$-2^2)$	$+(2^1$	$-2^0)$
628 =	2^9			$+2^6)$	$+2^5$	$+2^4$		$+2^2$		
=	1	0	0	1	1	1	0	1	0	0
=	+1	+1	+1	−1	+1	+1	+1	−1	+1	−1
=										−1
=	2^9	$+(2^8$	-2^7	$-2^6)$	$+2^5$	$+2^4$	$+(2^3$	$-2^2)$	$+(2^1$	$-2^0)$

Fig. 2



STATE	INPUT	NEXT	ACTION
H0	$i < 0$	DONE	
H0	$b_i = 0$	H1	DOUBLE, ADD
H0	$b_i = 1$	H0	DOUBLE, ADD
H1	$i < 0$	DONE	SUBTRACT
H1	$b_i = 0$	H1	DOUBLE, SUBTRACT
H1	$b_i = 1$	H0	DOUBLE, SUBTRACT

Fig. 3

```
BEGIN:
    $i := N$               ; START FROM MSB
    $Q := 0$               ; INITIALIZE ACCUMULATOR
    $H := 0$               ; INTIALIZE STATE

LOOP:                      ; FOR ALL BITS
    $Q := Q + Q$           ; DOUBLE ACCUMULATOR
    IF $H = 0$             ; IF $H$ STATE IS SET
      $Q := Q + P$         ;   ADD BASE POINT TO ACCUMULATOR
      GOTO ENDLOOP         ;
    ELSE                   ; ELSE
      $Q := Q - P$         ;   SUBTRACT BASE POINT
      GOTO ENDLOOP         ;

ENDLOOP:
    $H := \overline{b[i]}$ ; SET $H$ STATE TO COMPLEMENT OF $b[i]$
    $i := i - 1$           ; PROCESS NEXT BIT
    IF $i \geq 0$          ; IF BIT EXISTS
      GOTO LOOP            ;   CONTINUE AT TOP OF LOOP
    IF $H = 0$             ; IF EXITING FROM $H = 0$ STATE
      $Q := Q + (-P)$      ;   CORRECT RESULT BY FINAL SUBTRACT
    END
```

Fig. 4

```
BEGIN:
    $i := N$              ; START FROM MSB                               LL1
    $Q := 0$              ; INITIALIZE ACCUMULATOR                       LL2

H0:                       ; STATE ENTRY POINT
    $Q := Q + Q$          ; DOUBLE ACCUMULATOR                           LL3
    $Q := Q + P$          ; ADD BASE POINT TO ACCUMULATOR                LL4
    GOTO ENDLOOP          ; BRANCH TO END OF LOOP TESTS                  LL5

H1:                       ; STATE ENTRY POINT
    $Q := Q + Q$          ; DOUBLE ACCUMULATOR                           LL6
    $Q := Q + (-P)$       ; SUBTRACT BASE POINT FROM ACCUMULATOR         LL7
    GOTO ENDLOOP          ; BRANCH TO END OF LOOP TESTS                  LL8

ENDLOOP:                  ; END OF LOOP TESTS
    IF $b[i] = 1$         ; IF CURRENT BIT IS SET                        LL9
      GOTO NEXT H0        ;   FOLLOW H0 PATH                             LL10
                          ; ELSE FALL INTO H1 PATH
NEXT H1:                  ; H1 PATH
    $i := i - 1$          ; PROCESS NEXT BIT                             LL11
    IF $i > 0$            ; IF BIT EXISTS                                LL12
      GOTO H1             ;   EXECUTE H1 STATE                           LL13
    $Q := Q + (-P)$       ; ELSE CORRECT RESULT AND END                  LL14
    END                                                                  LL15

NEXT H0:                  ; H0 PATH
    $i := i - 1$          ; PROCESS NEXT BIT                             LL16
    IF $i > 0$            ; IF BIT EXISTS                                LL17
      GOTO H0             ;   EXECUTE H0 STATE                           LL18
    END                   ; ELSE END                                     LL15
```

Fig. 5

```
BEGIN:
    $i := N$
    $Q := 1$

H0:
    $Q := Q \cdot Q\ (Q^2)$
    $Q := Q \cdot M$
    GOTO ENDLOOP

H1:
    $Q := Q \cdot Q$
    $Q := Q/M\ (Q \cdot M^{-1})$

ENDLOOP:
    IF $b[i] = 1$ GOTO ENDLOOP

NEXT H1:
    $i := i - 1$
    IF $i > 0$
      GOTO H1
    $Q := Q/M$
    END

NEXT H0:
    $i := i - 1$
    IF $i > 0$
      GOTO H0
    END
```

60

Fig. 6

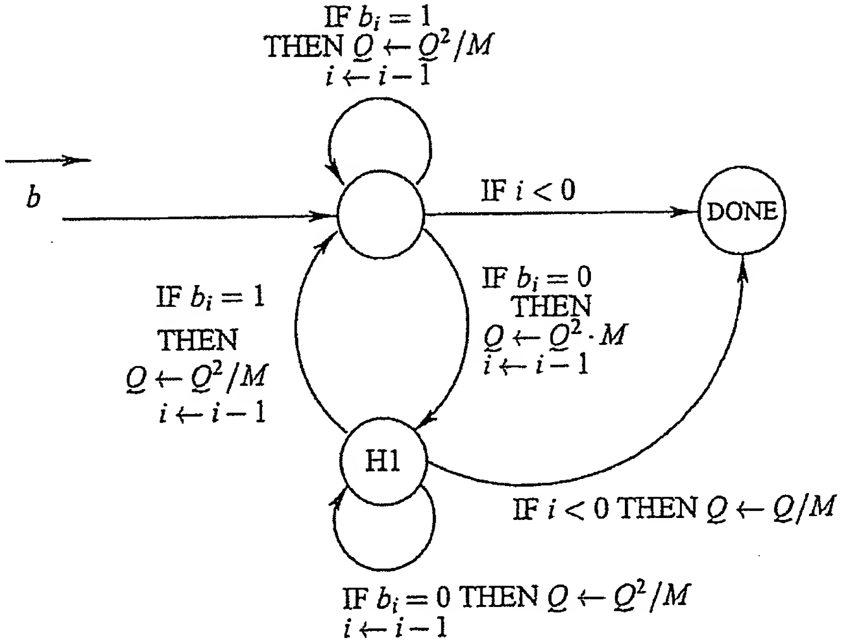
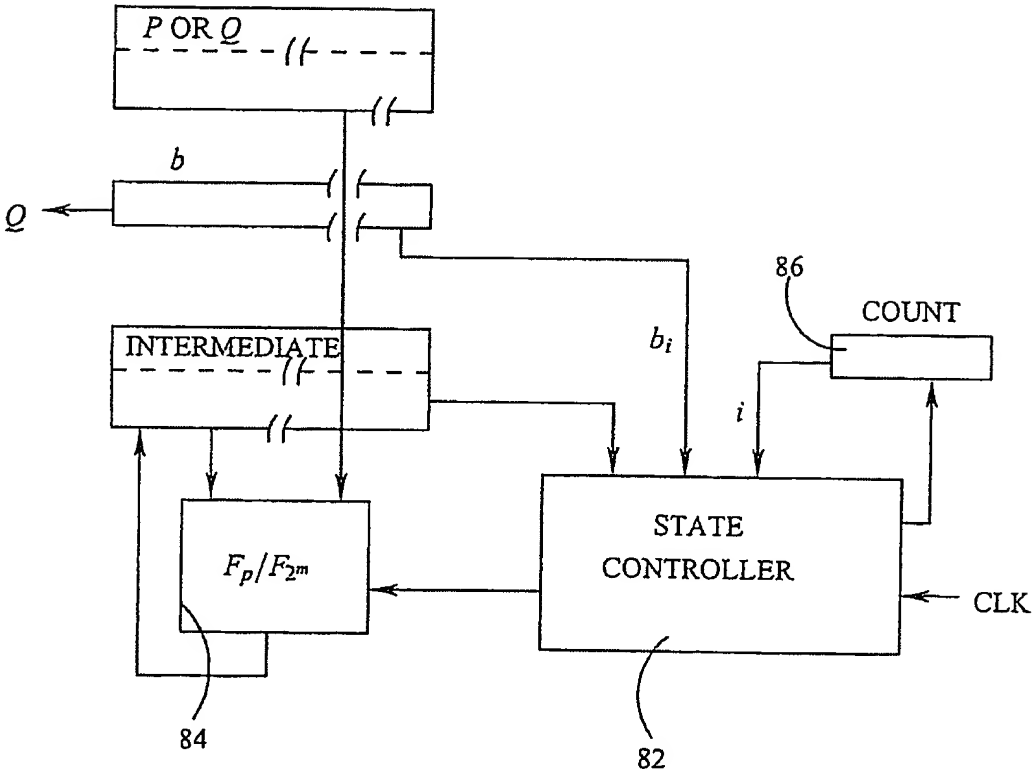

IF $b_i = 1$
THEN $Q \leftarrow Q^2/M$
$i \leftarrow i-1$
b
IF $i < 0$
DONE
IF $b_i = 1$
THEN
$Q \leftarrow Q^2/M$
$i \leftarrow i-1$
IF $b_i = 0$
THEN
$Q \leftarrow Q^2 \cdot M$
$i \leftarrow i-1$
H1
IF $i < 0$ THEN $Q \leftarrow Q/M$
IF $b_i = 0$ THEN $Q \leftarrow Q^2/M$
$i \leftarrow i-1$

Fig. 7



P OR Q
b
Q
INTERMEDIATE
b_i
86
COUNT
i
F_p/F_{2^m}
STATE
CONTROLLER
CLK
84
82

Fig. 8